Learning difficulties: Symptoms, causes, and solutions

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Abstract

Helping children who struggle with language- and/or cognitive-based learning difficulties is a complex issue, but with the application of researched-based sensory-cognitive instruction, it is now possible to better prevent children either from landing in a deficit situation or remediating them once they do fall behind their peers. This paper will illustrate these effects through the lens of a meta-analyses from a cross section of students with disabilities within the United States and
a comparative observational research inquiry from very-low-performing schools in Colorado. These results will be offered relative to building a stronger understanding of symptoms, causes, and solutions for specific sensory-cognitive, language-based learning difficulties. The central thesis of these research findings is based on the effects of embracing and applying a comprehensive, robust, inclusive Theory of Mind pedagogy based on Dual Coding Theory. The subjects in this study were served within an inclusive environment, thereby improving a community's capacity to increase achievement for special education students. Methodologically, outcomes will be offered from a mixed-methods research perspective using neuro-scientific, tightly controlled clinical or behavioral interventions, and real-world ecological validity evidenced-based examples from regular educational environments. These findings provide new insight into a research-based sensory-cognitive approach that can meet the challenge of significantly improving the success of children and youth with special education needs.

Key words: Inclusion, Exceptional Needs, Learning Difficulties, Self-Efficacy

Introduction

Clearly the goal for educating all children is to have them reach full self-efficacy in their learning behaviors, academic life, ultimately ending in positively participating in the world in which they live. This is especially true for children with exceptional needs. Historically, the prevailing model of addressing language-based learning deficits for children has been to isolate special needs children away from their peers and the community in which they live to address their learning needs. The antiquated model of isolating special education students is particularly alarming when the educational deficits of such students are often compounded by physical disabilities, poverty, abuse, disease, and even war. These individuals—who often need the most assistance—may never even have the opportunity for a normalized education with individuals their own age. How is this to be systematically addressed?

The first challenge is to discover and document, within the early developmental phases of children's growth, the symptoms and causes of at-risk learning behaviors. The next challenge is to then prescribe, on a student-by-student basis, the intervention(s) or solutions to the cause(s) of their difficulties in a scientifically based theoretical model and engage students as much as possible within an ecologically valid inclusive environment.

This is precisely the approach that Lindamood-Bell Learning Processes has been continuously researching and developing with the goal of effectively addressing the wide range of causes and solutions needed for children who are at risk in their learning behaviors. The central model and associated pedagogy of this process is based on Dr. Allan Paivio's Dual Coding Theory, which focuses

on the relationship between language processing and mental imagery. "This theory assumes a distinction between two mental codes: the verbal code and the nonverbal code. Both codes involve various sensory modalities (e.g., visual, auditory, and haptic). Reading as decoding, comprehension, and response is explained via representation and processing within and between the two mental codes in this theory. One of the many instructional implications of this theory is its emphasis on concrete language and multisensory experiences (for extensive treatments of the theory and comparison with other theories of reading, see Sadoski & Paivio, 2001, 2004)." (Sadoski and Willson 2006). Based on nearly thirty years of educational experience, the knowledge we have gained, and the solutions we have discovered, has helped thousands of children learn to their potential. However these solutions remain comparatively unknown in many communities, especially at a global level, in spite of a large corpus of evidence.

What research and practices must be revealed, embraced, and acted upon to best address this demand? The concept of inclusive approaches to meeting the learning needs of children is one of the paramount factors associated with maximizing the potential of all children. What theoretical model is the most compatible with an inclusive approach and how have we researched its application to meeting student learning needs?

Method

The methods we have chosen include two studies. The first is a meta-analysis based on clinical research from our private Learning Centers across the United States, and the second is an observational study based on results from a public elementary school in Colorado.

Study #1 (Meta-Analyses)

Inclusion Criteria

Two separate meta-analyses were conducted based on the type of Lindamood-Bell® instruction received—the Seeing Stars® program that addresses decoding deficits and the Visualizing and Verbalizing® program that addresses comprehension deficits. Both analyses are based on several studies involving subjects with learning disabilities and deficits. The studies in each area were based on previously reported diagnoses. All studies are based on a single-group, pre-/posttest designs, and were conducted in 2013 at Lindamood-Bell Learning Centers across the United States. Subjects were primarily school-aged and received a minimum of 20 hours of Lindamood-Bell instruction. Table 1 shows the number of studies, disabilities, and the outcome measures for both analyses.

Effect sizes (d) based on standard score changes (posttest–pretest) were calculated using the following formula: M / SD. Mean effect sizes were determined by averaging across all studies. For example, within Seeing Stars, an average was taken of the five effect sizes for Symbol Imagery, one for each study (i.e., disability category).

Results

Sample sizes were large (> 30) for all of the studies except hyperlexia. Table 2 shows the sample sizes for each of the studies.

Table 2. Study Sample Sizes

Seeing Stars (Decoding)		Visualizing and Verbalizing (Comprehension)	
Study	*N*	Study	*N*
Dyslexia	225	Autism	49
Attention-Deficit Hyperactivity Disorder	200	Asperger's Syndrome	36
Specific Learning Disability	106	Pervasive Developmental Disorder	41
Speech or Language Impairment	76	Hyperlexia	13
Central Auditory Processing Disorder	40	Speech or Language Impairment	89

Table 3 shows the effect sizes for all outcome measures for each of the studies.

Study	SI	LAC	WRMT	SORT	GORT-FLU	Study	PPVT	DTLA-OD	DTLA-WO	GORT-COMP
Dyslexia	1.24	1.05	1.11	1.10	.74	Autism	.51	.64	.57	.56
ADHD	1.34	1.11	1.24	1.10	.72	Asperger's	.48	.84	.69	.90
SLD	1.40	.98	1.45	1.15	.79	PDD	.25	.55	.31	.46
SLI	1.50	.92	1.19	.97	.63	Hyperlexia	.82	.99	.24	.58
CAPD	1.51	.92	1.49	1.32	.76	SLI	.58	.48	.49	.61

Note. SI = Symbol Imagery Test, LAC = Lindamood Auditory Conceptualization Test, WRMT = Woodcock Reading Mastery Test (word attack), SORT = Slosson Oral Reading Test, GORT-FLU = Gray Oral Reading Test (fluency), PPVT = Peabody Picture Vocabulary Test, DTLA- OD = Detroit Tests of Learning Aptitude (oral directions), DTLA-WO = Detroit of Learning Aptitude (word opposites), GORT-COMP = Gray Oral Reading Test (comprehension), ADHD = Attention-Deficit Hyperactivity Disorder, SLD = Specific Learning Disability, SLI = Speech or Language Impairment, CAPD = Central Auditory Processing Disorder, Asperger's = Asperger's Syndrome, PDD = Pervasive Developmental Disorder.

Using Cohen's criteria to interpret effect sizes (small = .20, medium = .50, and large =.80), large effects were realized on four of the five outcome measures in the Seeing Stars meta- analysis, and medium effect sizes were realized on three of the four outcome measures in the Visualizing and Verbalizing meta-analysis. Table 4 shows the mean effect sizes and magnitude (small, medium, or large) for both of the meta-analyses.

Table 4. Meta Analyses Effect Sizes

Outcome Measure	*M*	Magnitude	Outcome Measure	*M*	Magnitude
Symbol Imagery Test	1.40	Large	Peabody Picture Vocabulary Test	.53	Medium
Lindamood Auditory Conceptualization Test	1.00	Large	Detroit Tests of Learning Aptitude (oral directions)	.70	Medium
Woodcock Reading Mastery Test (word attack)	Test 1.30	Large	Detroit Tests of Learning Aptitude (word opposites)	.46	Small
Slosson Oral Reading Test	1.13	Large	Gray Oral Reading Test (comprehension)	.62	Medium
Gray Oral Reading Test (fluen	cy).73	Large			

Study #2 (Observational)
Coupled with our clinical findings, for ecological validity reasons, we have been researching and addressing the needs of all at-risk populations from across the U.S. Finally, we have investigated the process and programs from a real-world application standpoint to ascertain this theoretical educational model by operationalizing it within the context of public education.
Six low-performing elementary schools in Colorado participating in a federal school improvement grant initiative were included in this observational study. All schools began implementing the above-

referenced reading interventions to turnaround their schools during the 2010–11 school year. One school, Haskin (experimental) implemented Lindamood-Bell Dual Coding Theory base programs both developmentally and remedially, and the other five schools (comparison) implemented other interventions. All schools implemented their respective reading interventions from 2010–11 to 2012–13. The outcome measure for this study was the state language arts assessment in Colorado, the Transitional Colorado Assessment Program.

Results
Haskin Elementary School outperformed the other five elementary schools in terms of change (2010 to 2013) in percent proficient and advanced on the reading portion of the Transitional Colorado Assessment Program. Table 5 shows the average change in percent proficient and advanced across grades 3–5.

Table 5. Average Change in Percent Proficient and Advanced on State Assessment

School	Haskin	Clifton	Gilpin	Greenlee	Hanson	Sheridan
Δ	29	11	11	7	4	1

Conclusions
We see great value in sharing our research with the Division of International Special Education and Services (DISES) community because we believe this research can serve as a catalyst for the international exchange of information that will help improve global learning practices for individuals with exceptional educational needs. Indeed, the model outlined here is now being spread internationally. From these findings, we expect that educators and families will gain greater awareness of the underlying causes that manifest symptoms of learning difficulties, and the research-validated solutions they can help students overcome. Ultimately, it is now clear that building a common understanding between practitioners and families can be significantly enhanced by creating communities that embrace a model with a much more robust, inclusive model to meet the needs of all students and supporting the opportunity for every single member of the community to learn and succeed.

Acknowledges

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